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Research Notes : ' N-23-A' A new promising variety of soybean for Chotanagpur

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1) 'N-23-A' a new promising variety of soybean for Chotanagpur

Soybean is a unique dual-purpose leguminous crop containing high quantity of protein (40%) along with sufficient (20%) extractable edible oil. Its nutritive value is very highly suited for versatile industrial uses. Its increasing industrial exploitation also has led to the manufacture of a large number of antibiotics in our country. According to Singh (1978) it is the cheapest, richest and best source of protein and fat. Its seed yield is highest among pulses and oilseed crops and production is easiest and most economical.

Soybean is a highly lime-responsive crop and can be grown economically in the acidic soils of the uplands of Chotanagpur (Bihar) with the application of lime (Mandal, 1962). Well-drained upland soils of this region have been found to be ideally suited for soybean cultivation.

In the past, 'Punjab-1' was found to be the most promising soybean variety for this region (Bhargava and Rao, 1972), but with the intensification of research work on this crop in the state of Bihar under I.C.A.R. Co-ordinated Research Project, 'Bragg' and 'Alankar' varieties were recommended to replace Pb-1 for the uplands of the plateau region of Bihar. This region has special advantage over other regions in India in that soybeans are found to be free from yellow mosaic virus which is a serious disease of this crop in India.

During the subsequent years under the coordinated varietal trials conducted at Ranchi Agricultural College, Kanke variety 'N-23-A' has shown better promise than Bragg and Alankar during the last three years. This variety is evolved from 'Sepaya Black' out of the progeny of a white-seeded natural mutant plant detected in the field of a black-seeded variety.

Three-years yield data and combined analysis of 14 varieties included in the trials are presented in Table 1. The results indicate that N-23-A is superior to Alankar in seed yield and also is consistent in performance. Alankar was highest yielding variety of this region. N-23-A has also shown promise in seed yield over other entries in minikit trials conducted in farmers' fields and government farms (Table 2). In all-India coordinated trial (1980), N-23-A gave highest seed yield in Delhi, Ranchi and Palampur.

N-23-A (Birsa Soy.I) has white flowers, golden brown pods, dark green foliage with tawny pubescence, medium sized (47 cm) erect stem, height of the plant is nearly twice the length of the main stem because of its upright standing position of leaves, a unique favorable characteristic for efficient utilization of solar energy for photosynthesis. Seeds are bold shining black with dull white hilum, oval in shape; 100-seed weight is 12.5 gms. There is 41.7% protein and 20.4% oil in the seeds. Their germination quality is much better than Alankar.

N-23-A is found resistant to bacterial pustule and rust diseases. It was also found to be resistant to yellow mosaic, phytophthora root rot and downy mildew under prevailing climatic conditions of Ranchi.

Table 1. Seed yield (kg/ha)

Sl. no.	Varieties	Seed yield (kg/ha)			Mean	Rank
		1978-79	1979-80	1980-81		
1.	N 19	2407	1917	2625	2316	II
2.	I15A	2259	1667	2264	2063	IX
3.	I8	1907	1694	2222	1941	X
4.	NA-2	2573	2028	2208	2269	III
5.	I-14B	2203	1986	2195	2128	VII
6.	N-3	2518	1775	2167	2153	VI
7.	N-7	2055	1897	2153	1935	XI
8.	N-23-A	2870	2195	2097	2387	I
9.	N-22	2425	2195	2097	2239	IV
10.	I-13B	2073	1736	1958	1922	XII
11.	I-2	2475	1944	1931	2100	VIII
12.	Alankar	2851	1889	1819	2186	V
13.	S. Black	2018	903	1681	1534	XIV
14.	I-6	2370	1542	1431	1781	XIII
SEm ± (kg/ha)		209	130	469	176	
C.D. at 5% (kg/ha)		430	358	N.S.	494	
C.V. %		10.87	13.98	22.81	14.77	

Table 2. Seed yield (kg/ha) in minikit trials

Sl. no.	Varieties	Cultivator's field '79-80			Mean	1980-81	Mean
		Ormanjhi	Nagri	Sukurhuttu		Govt. farm	
1.	NA-2	13.95	5.19	9.42	9.92	25.50	17.71
2.	N-23-A	14.51	8.56	15.82	13.98	24.80	19.39
3.	Alankar	12.08	4.88	12.98	9.98	22.50	16.24
4.	N-22	13.88	5.87	11.47	10.07	21.50	15.63

Considering its superiority in yield potential and consistency in performance in fluctuating weather conditions of this tract over Alankar, N-23-A (Birsa Soy.I) will be recommended shortly for release by the Research Council of Birsa Agricultural University, Bihar for cultivation in Chotanagpur.

References

Mandal, S. C. 1962. Crop production in the upland of Chotanagpur, J. Agric. Coll. Res. Kanke, Ranchi 2:39-41.

Bhargava, R. H. and M. S. Subba Rao. 1972. Chotanagpur can cultivate soybean. Indian Farm. 47.

Singh, D. P. 1978. Soybean in Chotanagpur. The New Republic XXI-41.

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2) Effect of growth regulators Cycocel (CCC), Regim-8 (TIBA) and Ethrel (CEPA) on soybean crop

Summary: Soybean variety 'Punjab-1' was sown in the research area of the Ranchi Agricultural College, Kanke, Ranchi, for studying the effect of the three growth regulators, viz.: Cycocel (CCC), Regim-8 (TIBA), and Ethrel (CEPA), on the crop yield. All the three chemicals significantly out-yielded the control. The maximum yield (2914 kg/ha), however, was obtained as the result of one foliar spray of Cycocel (750 cc/ha) 10 days after flowering, which was closely followed by Regim-8 at 100 cc/ha (2790 kg/ha). The increase in yield was 39.7% with Cycocel and 33.7% with Regim-8 as compared to control. All three growth-regulating chemicals also caused marked reduction in dry weight of vegetative plant parts with concomitant increase in dry weight of reproductive plant parts, which resulted in increased yield of soybean.

Introduction: Cycocel (2, chloro-ethyltrimethyl ammonium chloride), Regim-8 (Triiodobenzoic acid) and Ethrel (2, chloro-ethyl phosphoric acid) are plant-growth regulators that produce varied responses in a wide variety of crop plants. The primary action of CCC is to shorten the length of stem internodes and, thereby, reduce plant dry weight (Humphries and Dyson, 1967; Gunasena and Harris, 1969; Gunasena, 1970a, 1970b). This effect is reported to be due to inhibition of gibberellic biosynthesis (Reid and Carr, 1967). CCC-treated plants, after recovery from moisture stress, yielded more in comparison to untreated plants (Gill and Singh, 1978). Regim-8 has been found to produce a vertical orientation of leaves and triangular-shaped row canopy and thereby promote more efficient utilization of solar energy because of less self-shading by leaves in soybean crop (Greer and Anderson, 1965; Wax and Pendleton, 1968). The dry weight of vegetative plant parts was reduced, while reproductive plant parts were increased due to the above effect (Rao and Agrawal, 1981, unpublished). Ethrel, on application to plant, releases ethylene gas which is a broad-spectrum physiological agent in plant metabolism. With the above background knowledge of these growth

regulators, a trial was conducted to quantify the benefits to soybean crop in terms of extra yield.

Materials and Methods: The experiment was conducted for three consecutive years, 1978 through 1980, at Ranchi Agricultural College Farm, Kanke, Ranchi. The treatments were, Cycocel at 150, 200 and 750 cc/ha, Regim-8 at 50, 75 and 100 cc/ha, and Ethrel at 1500, 2000 and 2500 cc/ha. All the chemicals were sprayed at 10 days after first flowering. There was one control treatment with no spraying. The soybean variety Punjab-1 was sown at 45-cm row-to-row distance and plants were thinned at 5 cm apart in a randomized block design. The normal manurial schedule 80:60:40 kg NPK/ha was followed. Standard plant protection measures were adopted as and when required.

Results and Discussion: The data of mean yields and mean dry weight of vegetative and reproductive plant parts are furnished in Table 1, which will show that in each of the three years of trial, all the treatments significantly out-yielded the control. During the first year, the treatment yields varied from 2933 to 3413 as against 2447 kgs in the control. In the second and third years, the treatment yields ranged from 2240 to 2925 and 1946 to 2404 kgs as against 2148 and 1692 kgs in control, respectively. In all three years, the highest yields were recorded by Cycocel at 750 cc/ha. But in the first year, the Cycocel at 200 cc/ha and all the three doses of Regim-8 and of Ethrel were at par with this treatment; in the second year only Regim-8 at 100 cc/ha and Ethrel at 2500 cc/ha were at par while in the third year, both the lower doses of Cycocel (150 and 200 cc/ha), all the three doses of Regim-8 and Ethrel at 2500 cc/ha were at par with this treatment. In the combined analysis of the three years' data, this treatment (Cycocel 750 cc/ha) significantly out-yielded all the treatments including control, except Regim-8 at 100 cc/ha. Thus, Cycocel at 750 cc/ha proved the best treatment in increasing the yield of soybean closely followed by Regim-8 at 100 cc/ha. The increases in mean yields over the control due to the application of Cycocel at 750 cc/ha were 40.6, 36.2, 42.1% in 1978, 1979 and 1980, respectively and 39.7% over the three years' average yield, the corresponding increases due to Regim-8 at 100 cc/ha being 37.3, 29.3, 33.5 and 33.7%.

An examination of the data of mean dry weights of vegetative and reproductive plant parts will show that the application of those three growth regulators in each concentration had markedly reduced dry weights of vegetative plant parts and increased those of the reproductive plant parts as compared to the control, the reduction percentage varying from 26.3 to 61.3 and the percentage increase ranged between 14.3 and 85.7 in the different treatments. The highest reduction and increase was recorded by Cycocel at 750 cc/ha followed by Regim-8 at 100 cc/ha. These results are in agreement with those of Humphries and Dyson (1967).

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Table 1. Mean grain yields of vegetative and reproductive parts

Treatment	Mean grain yield in kg/ha			
	1978	1979	1980	Combined
Cycocel-150 cc/ha	2933 b	2481 cd	2084 ab	2499 de
Cycocel-200 cc/ha	3147 ab	2574 be	2176 ab	2633 bcd
Cycocel-750 cc/ha	3413 a	2925 a	2404 a	2914 a
Regim-8-50 cc/ha	3333 a	2611 bc	2156 ab	2700 bc
Regim-8-75 cc/ha	3173 ab	2555 bc	2164 ab	2631 bcd
Regim-8-100 cc/ha	3333 a	2777 ab	2259 ab	2790 ab
Ethrel-1500 cc/ha	3147 ab	2240 de	1946 bc	2444 e
Ethrel-2000 cc/ha	3120 ab	2555 bc	2020 b	2565 cde
Ethrel-2500 cc/ha	3227 ab	2759 ab	2211 ab	2732 bc
Control	2427 c	2148 e	1692 c	2086 f
S. Em	100.5	52.3	108.5	57.7
C.D. at 5%	299.0	269.0	323.0	172.0
C.V.	5.6	6.1	8.9	3.8

N.B.: Figs. with different letters differ significantly at $P \leq 0.05$.

Table 2. Mean dry weight of vegetative and reproductive parts

Treatment	Mean dry weight in 'g' at 85 DAS*							
	Vegetative plant parts				Reproductive plant parts			
	1978	1979	1980	Mean	1978	1979	1980	Mean
Cycocel-150 cc/ha	9.9	9.7	9.2	9.6	3.2	2.7	3.8	3.2
Cycocel-200 cc/ha	9.8	9.5	8.3	9.2	4.6	3.4	3.8	3.9
Cycocel-750 cc/ha	8.4	9.0	7.9	8.4	5.5	5.3	4.8	5.2
Regim-8-50 cc/ha	15.0	20.5	10.6	15.3	3.4	3.0	3.9	3.4
Regim-8-75 cc/ha	14.7	19.9	9.6	14.7	5.5	4.8	2.2	4.2
Regim-8-100 cc/ha	12.8	19.8	9.2	13.9	5.6	5.5	3.7	4.9
Ethrel-1500 cc/ha	15.3	20.8	11.9	16.0	3.8	3.1	4.5	3.8
Ethrel-2000 cc/ha	13.7	18.6	10.9	14.4	4.9	4.0	4.9	4.6
Ethrel-2500 cc/ha	12.2	13.7	10.8	12.2	4.9	4.2	5.0	4.7
Control	25.0	26.9	13.2	21.7	3.5	3.0	2.0	2.8

*DAS = Days after sowing.

References

Gill, K. S. and O. N. Singh. 1978. Physiological response of dwarf wheat to chlorocholine chloride under soil moisture stress. Biol. Plant. (Prague) 20(6):421-424.

Greer, H. A. L. and I. C. Anderson. 1965. Response of soybean to triiodobenzoic acid under field conditions. Crop Sci. 5(3):229-232.

Gunasena, H. P. M. and P. M. Harris. 1969. The effect of CCC and nitrogen on the growth and yield of the second early potato, variety Craig's Royal. J. Agric. Sci. Camb. 73:245-259.

Gunasena, H. P. M. 1970a. The effect of time of application of nutrients on nutrient recovery and growth of potato. Trop. Agric. 126:65-83.

Gunasena, H. P. M. 1970b. The effect of (2 chloroethyl) trimethyl ammonium chloride (CCC) and time of application of nitrogen and potassium on the growth of the potato, variety Craig's Royal, J. Nat. Agric. Soc. of Ceylon 6:1-22.

Humphries, E. C. and P. W. Dyson. 1967. Effect of growth regulators CCC and B9, on some potato varieties. Ann. Appl. Biol. 60:333-334.

Rao, M. S. S. and P. C. Agrawal. 1981. Response of groundnut (*Arachis hypogaea* L.) to Regim-8 (Tiba), Cycocel (CCC) and Ethrel (CEPA) under field conditions. Unpublished.

Reid, D. M. and D. D. Carr. 1967. Effect of a dwarfing compound, CCC on the production and export of gibberellic like substances by root systems. Planta (Berl.) 73:1-110.

Wax, L. M. and J. W. Pendleton. 1968. Influence of TIBA on soybeans planted in different cultural systems. Agron. J. 60:425-427.

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